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- 1. An isolated nucleic acid molecule having at least 80% sequence identity to (a) a nucleic acid molecule that encodes an Mrg polypeptide comprising the amino acid sequence of SEQ ID NO: 2, 4, 6, 8, 10, 12, 16, 18, 21, 23, 25, 27, 31, 33, 35, 37, 39, 41, 43, 45, 47, 49, 51, 53, 55, 57, 59, 61, 63, 65, 67, 69, 71, 73, 75, 77, 79, 81, 83, 85, 87, 89, 91, 93, 95, 97, 99, 101, 103, 105, 107 or 109, or (b) the complement of the nucleic acid molecule of (a).
- 2. An isolated nucleic acid molecule having at least 80% sequence identity to (a) a nucleic acid molecule that encodes a drg-12 polypeptide comprising the amino acid sequence of SEQ ID NO: 14, 19 or 29, or (b) the complement of the nucleic acid molecule of (a).
- 3. An isolated nucleic acid molecule that hybridizes under stringent conditions to (a) a nucleic acid molecule that encodes an Mrg polypeptide comprising the amino acid sequence of SEQ ID NO: 2, 4, 6, 8, 10, 12, 16, 18, 21, 23, 25, 27, 31, 33, 35, 37, 39, 41, 43, 45, 47, 49, 51, 53, 55, 57, 59, 61, 63, 65, 67, 69, 71, 73, 75, 77, 79, 81, 83, 85, 87, 89, 91, 93, 95, 97, 99, 101, 103, 105, 107 or 109, or (b) the complement of the nucleic acid molecule of (a).
- 4. An isolated nucleic acid molecule that hybridizes under stringent conditions to (a) a nucleic acid molecule that encodes a drg-12 polypeptide comprising the amino acid sequence of SEQ ID NO: 14, 19 or 29, or (b) the complement of the nucleic acid molecule of (a).
- 5. The isolated nucleic acid molecule of any one of claims 1 to 4 operably linked to an expression control element.
- 6. The isolated nucleic acid molecule of claim 5 operably linked to a promoter element.
  - 7. A vector comprising the isolated nucleic acid molecule of any one of claims 1 or 2.
    - 8. A host cell comprising the vector of claim 7.
    - 9. The host cell of claim 8, wherein said cell is a prokaryotic cell.
    - 10. The host cell of claim 8, wherein said cell is a eukaryotic cell.
    - 11. The host cell of claim 9, wherein said cell is an *E. coli*.

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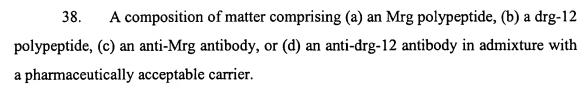
- 12. The host cell of claim 10, wherein said cell is a hamster embryonic kidney (HEK) cell.
  - 13. The host cell of claim 10, wherein said cell is a yeast cell.
- 14. A method for producing a polypeptide comprising culturing the host cell of claim 8 under conditions in which the protein encoded by said nucleic acid is expressed.
  - 15. An isolated polypeptide produced by the method of claim 14.
- 16. An isolated Mrg polypeptide comprising an amino acid sequence comprising at least about 80% sequence identity to the amino acid sequence of SEQ ID NO: 2, 4, 6, 8, 10, 12, 16, 18, 21, 23, 25, 27, 31, 33, 35, 37, 39, 41, 43, 45, 47, 49, 51, 53, 55, 57, 59, 61, 63, 65, 67, 69, 71, 73, 75, 77, 79, 81, 83, 85, 87, 89, 91, 93, 95, 97, 99, 101, 103, 105, 107 or 109.
- 17. An isolated drg-12 polypeptide comprising an amino acid sequence comprising at least about 80% sequence identity to the amino acid sequence of SEQ ID NO: 14, 19 or 29.
- 18. A chimeric molecule comprising an Mrg polypeptide fused to a heterologous amino acid sequence.
- 19. The chimeric molecule of claim 18 wherein said heterologous amino acid sequence is an epitope tag sequence.
- 20. The chimeric molecule of claim 18 wherein said heterologous amino acid sequence is an immunoglobulin constant domain sequence.
- 21. A chimeric molecule comprising a drg-12 polypeptide fused to a heterologous amino acid sequence.
- 22. The chimeric molecule of claim 21 wherein said heterologous amino acid sequence is an epitope tag sequence.
  - 23. The chimeric molecule of claim 21 wherein said heterologous amino acid sequence is an immunoglobulin constant domain sequence.
- An isolated polypeptide exhibiting at least about 40% sequence identity with at least one Mrg polypeptide selected from the group consisting of polypeptides comprising the amino acid sequences of SEQ ID NO: 2, 4, 6, 8, 10, 12, 16, 18, 21, 23, 25, 27, 31, 33, 35, 37, 39, 41, 43, 45, 47, 49, 51, 53, 55, 57, 59, 61, 63, 65, 67, 69, 71,

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- 73, 75, 77, 79, 81, 83, 85, 87, 89, 91, 93, 95, 97, 99, 101, 103, 105, 107 and 109, and exhibiting a qualitative biological activity of a native Mrg polypeptide.
- 25. An isolated polypeptide exhibiting at least about 35% amino acid sequence identity with at least one drg-12 polypeptide selected from the group consisting of polypeptides comprising the amino acid sequences of SEQ ID NO: 14, 19 and 29, and exhibiting a qualitative biological activity of a native drg-12 polypeptide.
- 26. An isolated antibody that specifically binds to an isolated Mrg polypeptide of claim 16.
- 27. The isolated antibody of claim 26 wherein said antibody is a monoclonal antibody.
- 28. The isolated antibody of claim 26 wherein said antibody is an antibody fragment.
- 29. The isolated antibody of claim 26 wherein said antibody is a humanized antibody.
- 30. The isolated antibody of claim 26 wherein said antibody is an agonist antibody.
  - 31. The isolated antibody of claim 26 wherein said antibody is a neutralizing antibody.
- 32. An isolated antibody that specifically binds to an isolated drg-12 polypeptide of claim 17.
  - 33. The isolated antibody of claim 32 wherein said antibody is a monoclonal antibody.
  - 34. The isolated antibody of claim 32 wherein said antibody is an antibody fragment.
- 35. The isolated antibody of claim 32 wherein said antibody is a humanized antibody.
  - 36. The isolated antibody of claim 32 wherein said antibody is an agonist antibody.
- 37. The isolated antibody of claim 32 wherein said antibody is a neutralizing antibody.



39. An article of manufacture comprising:

a container;

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a composition of matter of claim 38; and

instructions for using the composition of matter to treat impaired sensory perception in a mammal.

- 40. A method of identifying Mrg expression in a sample comprising contacting said sample with an anti-Mrg antibody and determining binding of said antibody to the sample.
- 41. The method of claim 40 wherein said sample is obtained from a patient experiencing impaired sensory perception.
  - 42. The method of claim 41 wherein said patient is experiencing pain.
- 43. A method of identifying a compound that binds to an Mrg polypeptide comprising the steps of:
  - 1) contacting a test compound with at least a portion of an Mrg polypeptide; and
    - 2) detecting Mrg/test compound complexes.
- 44. The method of claim 43 wherein at least one of the test compound or the Mrg polypeptide is attached to a solid support.
  - 45. The method of claim 44 wherein said solid support is a microtiter plate.
- 46. The method of claim 43 wherein said Mrg polypeptide is present in a cell membrane.
- 47. The method of claim 46 wherein said Mrg polypeptide is present in a fraction of cell membrane prepared from cells expressing an Mrg polypeptide.
  - 48. The method of claim 43 wherein said Mrg polypeptide is present in an immunoadhesin.
- 49. The method of claim 43 wherein said test compound is selected from the group consisting of peptides, peptide mimetics, antibodies, small organic molecules and small inorganic molecules.

- 50. The method of claim 49 wherein said test compound is a peptide.
- 51. The method of claim 50 wherein said peptide is anchored to a solid support by specifically binding an immobilized antibody.
  - 52. The method of claim 43 wherein said Mrg polypeptide is labeled.
  - 53. The method of claim 43 wherein said test compound is labeled.
- 54. The method of claim 43 wherein said test compound is contained in a cellular extract.
- 55. The method of claim 54 wherein said cellular extract is prepared from cells known to express an Mrg polypeptide.
- 56. The method of claim 55 wherein said cellular extract is prepared from dorsal root ganglion cells.
- 57. A method of identifying a molecule that binds to an Mrg polypeptide comprising the steps of:
  - 1) contacting a host cell expressing an Mrg polypeptide with a test compound; and
    - 2) determining binding of said test compound to said host cell.
  - 58. The method of claim 57 wherein said test compound is labeled.
- 59. The method of claim 58 wherein said test compound is radioactively labelled.
  - 60. The method of claim 57 wherein said host cell is a eukaryotic cell.
  - 61. The method of claim 60 wherein said host cell is a COS cell.
- 62. A method of identifying a compound that binds an Mrg polypeptide comprising the steps of:
  - 1) contacting an Mrg polypeptide or fragment thereof with a test compound and a known ligand under conditions where binding can occur; and
  - 2) determining the ability of the test compound to interfere with binding of the known ligand.
- 63. The method of claim 62 wherein said Mrg polypeptide is contacted with the known ligand prior to being contacted with the test compound.
- 64. The method of claim 62 wherein said known ligand is an RFamide peptide.

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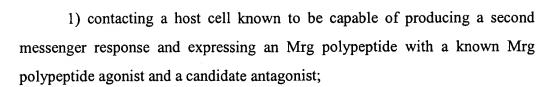
- 65. A method for identifying a compound that modulates expression of a nucleic acid encoding an Mrg receptor comprising the steps of:
  - 1) exposing a host cell, transformed with a nucleic acid encoding a chimeric polypeptide comprising an Mrg polypeptide and a reporter protein, to a test compound; and
  - 2) determining if there is differential expression of the reporter gene in cells exposed to the test compound compared to control cells that were not exposed to the test compound.
- 66. A method for identifying an Mrg polypeptide agonist comprising the steps of:
  - 1) contacting a host cell known to be capable of producing a second messenger responses and expressing an Mrg polypeptide with a potential agonist; and
    - 2) measuring a second messenger response.
  - 67. The method of claim 66 wherein said host cell is a eukaryotic cell.
  - 68. The method of claim 67 wherein said host cell is a hamster embryonic kidney (HEK) cell.
    - 69. The method of claim 68 wherein said HEK cell expresses Gα15.
  - 70. The method of claim 66 wherein measuring a second messenger response comprises measuring a change in intercellular calcium concentration.
  - 71. The method of claim 70 wherein said change in intercellular calcium concentration is measured with FURA-2 calcium indicator dye.
  - 72. The method of claim 66 wherein measuring a second messenger response comprises measuring the flow of current across the membrane of the cell.
  - 73. The method of claim 66 wherein the identified agonist is useful in treating impaired sensory perception in a mammal.
    - 74. The method of claim 73 wherein said impaired sensory perception is pain.
- 75. A method for identifying an Mrg polypeptide antagonist comprising the steps of:

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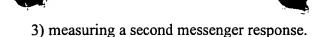
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- 2) measuring a second messenger response.
- 76. The method of claim 75 wherein said host cell is a eukaryotic cell.
- 77. The method of claim 76 wherein said host cell is a hamster embryonic kidney (HEK) cell.
- 78. The method of claim 75 wherein said known Mrg polypeptide agonist is an RFamide peptide.
- The method of claim 75 wherein said second messenger response is a 79. change in intercellular calcium concentration.
- 80. The method of claim 75 wherein said second messenger response is a change in the flow of current across the membrane of the cell.
- The method of claim 75 wherein the identified antagonist is useful in 81. treating impaired sensory perception in a mammal.
- 82. A method of identifying an Mrg polypeptide agonist antibody comprising the steps of:
  - 1) preparing a candidate agonist antibody that specifically binds to an Mrg polypeptide;
  - 2) contacting a host cell known to be capable of producing a second messenger response and expressing said Mrg polypeptide with the candidate agonist antibody; and
    - 3) measuring a second messenger response.
- A method of identifying an Mrg polypeptide neutralizing antibody 83. comprising the steps of:
  - 1) preparing a candidate neutralizing antibody that specifically binds an Mrg polypeptide;
  - 2) contacting a host cell known to be capable of producing a second messenger response and expressing said Mrg polypeptide with the candidate neutralizing antibody; and



- 84. A transgenic non-human mammal with increased or decreased expression levels of an Mrg polypeptide, wherein said transgenic mammal has stably integrated into its genome a nucleic acid molecule encoding an Mrg polypeptide of claim 16.
- 85. A method of treating impaired sensory perception in a mammal comprising administering to said mammal an agent that increases the expression of a polypeptide of claim 16 in said mammal.
- 86. The method of claim 85 wherein said impaired sensory perception is pain.